

**Project-level**  
**Management Indicator Assemblage Report**  
**Green-Horse Habitat Restoration and Maintenance Project**

*National Recreation Area Management Unit  
Shasta-Trinity National Forest  
Shasta County, California*



**Prepared By:** /s/ Patricia Johnson  
Patricia Johnson  
Wildlife Biologist  
USDA Forest Service  
VMS Enterprise Unit

August 28, 2014  
Date

**Reviewed By:** \_\_\_\_\_  
Wildlife Biologist  
or Environmental Coordinator

\_\_\_\_\_  
Date

## **1. Introduction**

The purpose of this report is to evaluate and disclose the impacts of the **Green-Horse Habitat Restoration and Maintenance Project (Green-Horse project)** on management indicator assemblage habitat identified in the Shasta-Trinity National Forest Land and Resource Management Plan (Forest Plan, USDA 1995). Detailed descriptions of the project are found in **Green-Horse Habitat Restoration and Maintenance Project Environmental Impact Statement (USDA 2014)**.

Management indicator assemblages are groups of wildlife associated with vegetative communities or key habitat components, as identified in the Forest Plan (page 3-24). The Forest Plan directs resource managers to monitor assemblage habitat trends at the National Forest scale (Forest-level). The Forest Plan permits the use of habitat components to represent the management indicator assemblages. This project-level report analyzes the effects of the project on habitat of each potentially affected management indicator assemblage, and describes how these effects to habitat may influence Forest-level trends.

### **1a: Methodology for Effects Analysis of Management Indicator Assemblages**

Project-level effects on management indicator assemblages are analyzed and disclosed as part of environmental analysis under the National Environmental Policy Act. This involves examining the impacts of the project alternatives on the habitat of each management indicator assemblage by discussing how the direct, indirect, and cumulative effects will change the quantity and/or quality of that habitat in the analysis area. These project-level impacts to habitat are then related to broader scale (Forest-level) habitat trends.

Analyzing project effects to management indicator assemblages involves the following steps:

- Identifying which management indicator assemblages have habitat that may be either directly or indirectly affected by the project alternatives.
- Analyzing project-level effects on the amount of habitat available for each management indicator assemblage and examining how project habitat effects may influence Forest-level assemblage habitat trends.

Project effects to assemblage habitat are assessed using Remote Sensing Data, EVEG 2007 in conjunction with NAIP imagery and field surveys. These data include tree size (or shrub size for chaparral), canopy cover, vegetation composition and density, and location of cliffs, caves, talus and rock outcrops. To provide context for the analysis of project effects to assemblage habitat, this analysis also discusses representative species from the potentially affected management indicator assemblages and relates project effects on habitat to that species. These are typically species for which the Forest is also gathering population data at the Forest level.

### **1b: Direction for and Implementation of Forest Scale Monitoring for Management Indicator Assemblages**

Forest level monitoring direction for the Shasta-Trinity National Forest management indicator assemblages is identified in the Monitoring Action Plan of the Forest Plan (USDA 1995, Chapter

5, Page 5-16). The Forest Plan provides direction for Forest scale monitoring of management indicator assemblages using habitat components to represent the assemblages (Forest Plan, page 5-16). Therefore, habitat status and trend is monitored at the Forest scale.<sup>1</sup> Population monitoring is not required. However, the Shasta-Trinity National Forest gathers high quality population data at the Forest level for a number of species. These types of monitoring are described in more detail below.

## **Habitat Status and Trend**

Monitoring assemblage habitat includes Forest level reporting of habitat status and trend. Habitat status refers to the current amount of management indicator assemblage habitat on the Forest. Habitat trend is the direction of change in the amount of management indicator assemblage habitat between the time the Forest Plan was approved and the present.

The Shasta-Trinity Forest Plan provides direction for Forest scale (Forest level) monitoring of management indicator assemblages using habitat components to represent the assemblages (Forest Plan, page 5-16). Habitat components that define each assemblage are described below in Table 1. The habitat components for Late Seral, Openings and Early Seral, Multihabitat, Hardwood, Riparian and Chaparral assemblages are categorized using the California Wildlife Habitat Relationship (CWHR) System (CDFG 2008). The CWHR System provides the most widely used habitat relationship models for California's terrestrial vertebrate species (ibid), and is described further in Appendix A.

The Forest wide quantity and distribution of management indicator assemblage habitat are monitored using Gradient Nearest Neighbor (GNN) vegetation layers developed for use in Northwest Forest Plan effectiveness monitoring.<sup>2</sup> The GNN vegetation layers are used by regional interagency monitoring teams to evaluate forest conditions in the Northwest Forest Plan area, under the direction of the Regional Interagency Executive Committee.<sup>3</sup> The GNN layers are developed by integrating data from field plots (forest inventory data) with satellite imagery and mapped environmental data, using gradient analysis and nearest-neighbor imputation. To assess changes in proportions of assemblage habitat on the Shasta-Trinity National Forest since the time of Forest Plan approval, the GNN layer developed to reflect vegetation in 1994 is compared to the most current GNN layer (2007).<sup>4</sup> A similar analysis, using vegetation layers produced by regional monitoring teams, was conducted to evaluate the status and trend of late-successional habitat since 1994 in the entire Northwest Forest Plan area (Moeur et al. 2005).

The Snag and Down Log assemblage is monitored using data collected at the Forest level by the Forest Service Forest Health Monitoring Program,<sup>5</sup> and by the Forest Service, Pacific Southwest

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<sup>1</sup> Forest Level Management Indicator Assemblage Report is available at:

[http://www.fs.usda.gov/Internet/FSE\\_DOCUMENTS/stelprdb5292949.pdf](http://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb5292949.pdf)

<sup>2</sup> The Landscape Ecology Modeling, Mapping and Analysis team develops Gradient Nearest Neighbor vegetation layers and produces GNN maps for Northwest Forest Plan effectiveness monitoring. More information is at: <http://www.fsl.orst.edu/lemma/>

<sup>3</sup> Northwest Forest Plan monitoring reports, including Moeur et al. (2005) and Haynes et al. (2006), are available at: <http://www.reo.gov/monitoring/reports/10yr-report/index.shtml>

<sup>4</sup> The GNN vegetation layers are presently undergoing an accuracy assessment by the Forest Service Pacific Northwest Research Station for the ability to detect change between years. Each separate year of data used in this analysis has already been assessed for accuracy. Accuracy reports are available on the website noted above.

<sup>5</sup> USDA Forest Service Forest Health Monitoring Program: <http://www.fs.fed.us/r5/spf/fhp/fhm/index.shtml>

Region, Fire and Aviation Management fire and fuels monitoring project.<sup>6</sup> The forest health monitoring program monitors forest disease and insect outbreaks through annual aerial surveys that pinpoint new areas of snag recruitment and tracks the progress of previously reported outbreaks. The fire and fuels monitoring program monitors forest fire severity. Moderate and severe fires add large pulses of snags and down logs to the landscape. The Forest management indicator assemblage analysis uses data from annual aerial forest health surveys collected from 1994 through 2009, and wildfire severity data from 1994 through 2008. In addition, the Forest Service Activity Tracking System is used to monitor management activities across the Forest. These data were used to determine areas that consist of older plantations (generally created before 1994), which are known to be deficient in snags and down logs due to past forest management practices.

The cliffs, caves, talus and rock outcrops assemblage is composed of static landscape components of habitats that are identified in GNN data vegetation layers. Forest level trends for this assemblage are generally static and the occurrence of these habitat components across the Forest is not typically influenced by management. For project analyses, presence of these habitat components are recorded during field surveys to determine whether they are present and may be affected by the project.

**Table 1. Habitat components monitored for each management indicator assemblage.**

Management Indicator Assemblage	CWHR Habitat Components*
Late Seral	<p>Mature stands of conifers and hardwood conifer habitats, CWHR tree size 5, all canopy closures.</p> <p>CWHR habitat types include:</p> <ul style="list-style-type: none"> <li>• blue oak-foothill pine,</li> <li>• close-cone pine-cypress,</li> <li>• Douglas fir ,</li> <li>• eastside pine,</li> <li>• Jeffrey pine,</li> <li>• Klamath mixed conifer,</li> <li>• lodgepole pine,</li> <li>• montane hardwood conifer,</li> <li>• Ponderosa pine,</li> <li>• red fir,</li> <li>• sierran mixed conifer, and</li> <li>• white fir</li> </ul>

<sup>6</sup> USDA Forest Service, Pacific Southwest Region, Fire and Aviation Management, fire and fuels monitoring program: <http://www.fs.fed.us/r5/rsl/clearinghouse/gis-download.shtml#burnseverity>

Management Indicator Assemblage	CWHR Habitat Components*
Openings and Early Seral	Young forests and woodlands with openings, CWHR tree size 1, 2, 3, and 4, all canopy cover classes. CWHR habitat types include all CWHR types listed above in Late Seral Assemblage
Multi-Habitat	Proportion of all habitats in relation to each other on the Forest including conifer forests, woodlands, chaparral and riparian.
Snag and Down Log	Conifer and hardwood habitats with substantial snags and down logs. Areas with heavy tree mortality due to fire and/or disease.
Riparian	Dense streamside shrubby or forested habitat. CWHR habitat types include: <ul style="list-style-type: none"> <li>• montane riparian</li> <li>• valley foothill riparian</li> <li>• aspen<sup>7</sup></li> </ul>
Aquatic <sup>8</sup>	N/A
Hardwood	All size classes and canopy closures of woodlands composed of hardwood species. CWHR habitat types include: <ul style="list-style-type: none"> <li>• montane hardwood,</li> <li>• blue oak woodland,</li> <li>• valley oak woodland</li> </ul>
Chaparral	All size classes of shrub dominated habitats. CWHR types include: <ul style="list-style-type: none"> <li>• chamise-redshank chaparral</li> <li>• mixed chaparral</li> <li>• montane chaparral</li> <li>• bitterbrush</li> <li>• sagebrush</li> </ul>
Cliffs, Caves, Talus and Rock Outcrops	These habitat components are static landscape features that are identified in Forest level spatial data, and are not usually impacted by management activities.

\*Based on CWHR habitat suitability information. Dbh = diameter at breast height. Canopy Cover classifications: S=Sparse Cover (10-24% canopy cover); P= Open cover (25-39% canopy cover); M= Moderate cover (40-59% canopy cover); D= Dense cover (60-100% canopy cover). Tree size classes: 1 = Seedling (<1" dbh); 2 = Sapling (1"-5.9" dbh); 3=Pole (6"-10.9" dbh); 4 = Small tree (11"-23.9" dbh); 5 = Medium/Large tree (≥24" dbh); 6 =Multi-layered Tree (CDFG 2008).

## Population Status and Trend

As discussed above, management indicator assemblages are groups of wildlife species associated with particular habitat types. Although population status and trend monitoring is not required by the Forest Plan, the Forest has selected appropriate representative species for several

<sup>7</sup> Aspen is not strictly a riparian species, but in California it is usually associated with streams, seeps and wet meadows, and it is usually found with other riparian species such as willow and alder (CDFG 2008)

<sup>8</sup>Aquatics assemblage is analyzed in the fisheries management indicator assemblage report.

management assemblages and collects and/or compiles data regarding population status and trend for these species at the Forest level. Population status is the current condition of the population measure for the representative species. Population trend is the direction of change in that population measure over time. Population data are compiled and discussed in Forest level monitoring reports, which are issued every 3 to 5 years.

## 2. Selection of Project Level Management Indicator Assemblages

Each Shasta-Trinity National Forest management indicator assemblage was assessed to determine which may be affected by the Green-Horse project. Each assemblage was then assigned a category for project analysis (Table 2). The categories are: (1) management indicator assemblage habitat type is not in or adjacent to the project area and would not be affected by the project, (2) management indicator assemblage habitat type is in or adjacent to project area, but would not be either directly or indirectly affected by the project, or (3) management indicator assemblage habitat type would be either directly or indirectly affected by the project. The management indicator assemblages analyzed for the project were selected as indicated below in Table 2.

**Table 2. Management indicator assemblages for Green-Horse project project-level analysis.**

Management Indicator Assemblages	Category for Project Analysis*
Openings and Early Seral	3
Late Seral	3
Multi-Habitat	1
Snag and Down Log	3
Riparian	3
Hardwood	3
Chaparral	3
Cliffs, Caves, Talus, Rock Outcrops	2

\* Category 1: Assemblage habitat is not in or adjacent to the project area and would not be affected by the project;  
Category 2: Assemblage habitat is in or adjacent to project area, but would not be either directly or indirectly affected by the project;

Category 3: Assemblage habitat would be either directly or indirectly affected by the project.

### **Category 1 Assemblages**

None.

### **Category 2 Assemblages**

**Multi-habitat:** This assemblage is defined by the proportion of each assemblage habitat present, in relation to each other.<sup>9</sup> Six assemblages may be affected by this project: Late Seral, Openings and Early Seral, Snag and Downed Log, Riparian, Chaparral, and Hardwood. Since the project

<sup>9</sup> The snag and down log and cliff, cave, talus, and rock outcrop assemblages are not factored in to the proportions of habitat used to define the multi-habitat assemblage because these assemblages are defined by physical features and habitat components that overlay the other assemblages.

would not change the amount or distribution of any assemblage, there would be no effect to the proportion of assemblage habitats available. Because the *proportions* of these six assemblages will not be changed by the project, the Multi-habitat assemblage will not be discussed further in this report.

**Cliffs, Caves, Talus, and Rock Outcrops:** This assemblage is in and adjacent to the project area, but would not be either directly or indirectly affected by the project. This assemblage will not be further discussed in this report.

### **Category 3 Assemblages:**

**Openings and Early Seral:** Openings and Early Seral assemblage habitat (Sierran mixed conifer, Douglas fir, ponderosa pine, montane hardwood conifer, Closed-Cone Pine-Cypress, CWHR habitat types, with tree size classes 2 and 3) is present within treatment units and will be affected by implementation. These effects are discussed below.

**Late Seral:** Late Seral assemblage habitat (Sierran mixed conifer, Douglas fir, ponderosa pine, montane hardwood conifer, Closed-Cone Pine-Cypress, CWHR types with tree size class 4 and 5) can be found in the project area and will be affected by project implementation. These effects are discussed below.

**Snag and Down Log:** Snags and down log habitat assemblage exists throughout the project area and will be affected by project implementation. These effects are discussed below.

**Hardwood:** Hardwood habitat assemblage (CWHR type montane hardwood, montane hardwood conifer) and individual hardwoods exist in the project area and will be affected by project implementation.

**Riparian:** Riparian habitat assemblage exists in the project area and will be affected by project implementation. However, there are no distinct riparian vegetation communities mapped within the project area. Riparian vegetation is generally found within the forested vegetation alliances as a subcomponent limited to narrow areas adjacent to water features. An approximation of area containing riparian vegetation was analyzed based on proximity to 5<sup>th</sup> order and larger streams within the project area.

**Chaparral:** Chaparral habitat assemblage (CWHR type montane chaparral and mixed chaparral) can be found in the project area and will be affected by project implementation. These effects are discussed below.

Table 3 displays preferred reproductive habitat for the 6 representative species, using CWHR types that define the assemblages. Additionally, population data of high reliability are available for these species, and are tracked/compiled at the Forest level.<sup>10</sup>

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<sup>10</sup> The Forest compiles Breeding Bird Survey data (BBS) for the representative species, and reports them at the regional (BBS strata), California, and range-wide scales. Four BBS strata occur on the Forest. BBS data have varying degrees of reliability based upon sample size. Representative species selected for Forest level tracking have data with the highest reliability in at least one of the 4 strata that occur on the Forest.

The CWHR types listed in the table are moderately and highly suitable reproductive habitat for the representative species from the habitat suitability information provided in the CWHR program (CWHR 2008). The CWHR types that are part of the assemblages that are not listed in table below are used as low, moderate or high suitability feeding and cover habitat, and/or low suitability reproductive habitat by each species.

**Table 3.** Management indicator assemblage habitat suitability for the representative species within the Green-Horse project analysis area

Management Indicator Assemblage and Representative Species	Reproductive CWHR Habitat Suitability	CWHR Habitat Types <sup>11</sup>
<b>Late Seral</b>  Brown creeper ( <i>Certhia Americana</i> )	Moderate	Closed Cone – Pine Cypress, Tree size 4, 5, Canopy Cover M, D Douglas Fir, Tree size 4, Canopy Cover M, D Eastside Pine, Tree size 4, Canopy Cover M, D Jeffrey Pine, Tree size 4, Canopy Cover M, D Lodgepole Pine, Tree size 4, 5, Canopy Cover M, D Montane Hardwood-Conifer, Tree size 4, Canopy Cover M, D Ponderosa Pine, Tree size 3, Canopy Cover M, D Red Fir, Tree size 4, Canopy Cover M, D Red Fir, Tree size 5, Canopy Cover P
	High	Douglas Fir, Tree size 5, Canopy Cover M, D Eastside Pine, Tree size 5, Canopy Cover M, D Jeffrey Pine, Tree size 5, Canopy Cover M, D Klamath Mixed Conifer, Tree size 4, 5, Canopy Cover M, D Montane Hardwood-Conifer, Tree size 5, Canopy Cover M, D Ponderosa Pine, Tree size 4, 5, Canopy Cover M, D Red Fir, Tree size 5, Canopy Cover M, D Sierran Mixed Conifer, Tree size 4, 5, Canopy Cover M, D White Fir, Tree size 4, 5, Canopy Cover M, D
<b>Openings and Early Seral</b>  Nashville warbler ( <i>Oreothlypis ruficapilla</i> )	Moderate	Klamath Mixed Conifer, Tree size 2, 3, 4, Canopy Cover M Montane Hardwood – Conifer, Tree size 2, 3, 4, Canopy Cover M Ponderosa Pine, Tree size 2, 3, 4, Canopy Cover M Sierran Mixed Conifer, Tree size 2, 3, 4, Canopy Cover M Sierran Mixed Conifer, Tree size 5, Canopy Cover S, P, M White Fir, Tree size 2, 3, 4, Canopy Cover M
	High	Klamath Mixed Conifer, Tree size 2, 3, 4, Canopy Cover S, P Montane Hardwood – Conifer, Tree size 2, 3, 4, Canopy Cover S, P Ponderosa Pine, Tree size 2, 3, 4, Canopy Cover S, P

<sup>11</sup> Canopy Cover classifications: S=Sparse Cover (10-24% canopy cover); P= Open cover (25-39% canopy cover); M= Moderate cover (40-59% canopy cover); D= Dense cover (60-100% canopy cover). Tree size classes: 1 = Seedling (<1") dbh; 2 = Sapling (1"-5.9" dbh); 3=Pole (6"-10.9" dbh); 4 = Small tree (11"-23.9" dbh); 5 = Medium/Large tree (≥24" dbh); 6 =Multi-layered Tree (CDFG 2008).

Management Indicator Assemblage and Representative Species	Reproductive CWHR Habitat Suitability	CWHR Habitat Types <sup>11</sup>
		Sierran Mixed Conifer, Tree size 2, 3, 4, Canopy Cover S, P White Fir, Tree size 2, 3, 4, Canopy Cover S, P
<b>Snag and Down Log</b>  Red-breasted Nuthatch ( <i>Sitta canadensis</i> )	Moderate	Douglas Fir, Tree size 4, Canopy Cover S, P, M, D Eastside Pine, Tree size 5, Canopy Cover S, P, M, D Jeffrey Pine, Tree size 4, Canopy Cover S, P, M, D Klamath Mixed Conifer, Tree size 4, Canopy Cover S, P, M, D Lodgepole Pine, Tree size 5, Canopy Cover S, P, M, D Ponderosa Pine, Tree size 4, Canopy Cover S, P, M, D Red Fir, Tree size 4, Canopy Cover S, P, M, D Sierran Mixed Conifer, Tree size 3, Canopy Cover P, M, D Sierran Mixed Conifer, Tree size 4, Canopy Cover S, P, M, D White Fir, Tree size 4, Canopy Cover S, P, M, D
	High	Douglas Fir, Tree size 5, Canopy Cover S, P, M, D Jeffrey Pine, Tree size 5, Canopy Cover S, P, M, D Klamath Mixed Conifer, Tree size 5, Canopy Cover S, P, M, D Ponderosa Pine, Tree size 5, Canopy Cover S, P, M, D Red Fir, Tree size 5, Canopy Cover S, P, M, D Sierran Mixed Conifer, Tree size 5, Canopy Cover S, P, M, D White Fir, Tree size 5, Canopy Cover S, P, M, D
<b>Riparian</b>  Yellow warbler ( <i>Dendroica petechial</i> )	Moderate	Montane Riparian, Tree size 2, 3, Canopy Cover D Montane Riparian, Tree size 3, 4, Canopy Cover S
	High	Montane Riparian, Tree size 2, 3, 4, Canopy Cover P, M
<b>Chaparral</b>  Wrentit ( <i>Chamaea fasciata</i> )	Moderate	Chamise Redshank Chaparral, Shrub size 2, 3, 4, Cover P Chamise Redshank Chaparral, Shrub size 4, Cover S Mixed Chaparral, Shrub size 2, 3, 4, Cover S, P Montane Chaparral, Shrub size 2, 3, Cover M, D
	High	Chamise Redshank Chaparral, Shrub size 2, 3, 4, Cover M, D Mixed Chaparral, Shrub size 2, 3, 4, Cover M, D
<b>Hardwood</b>  White-breasted nuthatch ( <i>Sitta carolinensis</i> )	Moderate	Blue Oak Woodland, Tree size 4, Canopy Cover S, P Montane Hardwood, Tree size 4, Canopy Cover S, P Montane Hardwood-Conifer, Tree size 4, Canopy Cover S, P
	High	Blue Oak Woodland, Tree size 4, 5, Canopy Cover M, D Blue Oak Woodland, Tree size 5, Canopy Cover S, P Montane Hardwood, Tree size 4, 5, Canopy Cover M, D Montane Hardwood, Tree size 5, Canopy Cover S, P

**Representative Species for Openings and Early Seral:** The Nashville warbler is selected as an appropriate representative species for the Openings and Early Seral assemblage because it is

found in all of the Openings and Early Seral assemblage CWHR types, occurs in the area, and is strongly associated with specific habitat components that define the assemblage (Table 3).

***Representative Species for Late Seral:*** The **brown creeper** is selected as an appropriate representative species for the Late Seral assemblage because it is found in the Late Seral assemblage CWHR types, occurs in the area, and has a strong association with specific habitat components that define the assemblage (Table 3).

***Representative Species for Snag and Down Log:*** The **red-breasted nuthatch** is selected as an appropriate representative species for the Snag and Down Log assemblage because it is strongly associated with specific habitat components that define the assemblage (i.e., snags), and it occurs in the area (Table 3).

***Representative Species for Hardwood:*** The **white-breasted nuthatch** is selected as an appropriate representative species for the Hardwood assemblage because it is strongly associated with specific habitat components that define the assemblage, and it occurs in the area (Table 3).

***Representative Species for Riparian:*** The **yellow warbler** is selected as an appropriate representative species for the Riparian assemblage because it is found in the Riparian assemblage CWHR types, occurs in the area, and has a strong association with specific habitat components that define the assemblage (Table 3).

***Representative Species for Chaparral:*** The **wrentit** is selected as an appropriate representative species for the Chaparral assemblage because it is found in the Chaparral assemblage CWHR types, occurs in the area, and has a strong association with specific habitat components that define the assemblage (Table 3).

### **3. Description of Proposed Project**

#### ***Alternative 1***

Alternative 1 is the no-action alternative. If this alternative is selected, no fuels treatments would occur and there would be no need to amend the Forest Plan. Current management and uses of the National Forest System lands in the project area would continue. This alternative represents the existing conditions of the project area and the progression of these conditions that would occur naturally over time if no management actions are implemented. This alternative provides a baseline of conditions for comparison of potential effects of the action alternatives.

#### ***Alternative 2 - Proposed Action***

The Green-Horse project would establish a trend toward the desired conditions as described in the Forest Plan by reducing fuel accumulations on approximately 41,836 acres. The actions summarized below are proposed in order to address the underlying purpose and need<sup>12</sup> in the project area:

- Prescribed broadcast burning or underburning would occur on approximately 41,622 acres.

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<sup>12</sup> 40 CFR 1502.13

- Hand thinning and pruning of small trees and brush, followed by hand piling and pile burning or underburning, would occur on approximately 92 acres adjacent to private property.
- Hand thinning and pruning of small trees and brush, followed by hand piling and pile burning, would occur on approximately 35 acres surrounding recreation residences at Campbell Creek.
- Hand thinning and pruning of small trees and brush, followed by hand piling and pile burning or underburning, would occur on approximately 83 acres surrounding bald eagle nest sites.
- Approximately 4.61 miles (4 acres) of dozer line would be reconstructed in order to assist fire managers in safely conducting prescribed fire.

This alternative includes 41,836 acres of fuels treatments that would be accomplished over a 7 to 10 year period using an adaptive management strategy. It would require amending the Forest Plan to change down wood requirements in order to achieve our fuel reduction objectives and protect soils in specific management prescription areas. There would be no commercial timber harvest and no new road construction or road reconstruction. The overall goal is to create a landscape that would provide fire managers more options in the future to allow fire to play its natural role in the ecosystem.

Prescribed underburns would be applied on 41,622 acres in a mosaic pattern, with some portions of areas likely remaining unburned due to low fuel concentrations. The initial application of prescribed fire would be designed to remove live and dead vegetation on the ground as well as lower branches of trees to prevent a wildfire from spreading from the ground into the forest canopy. An average of 30 to 60 percent of brush and browse cover—much of which is currently overgrown and unpalatable to wildlife—would be burned in up to two separate prescribed fire applications per treatment area to stimulate new growth.

In riparian reserve areas, prescribed fire would be of low intensity with no more than 10 percent of the area receiving a moderate-intensity burn. Moderate-intensity burns in riparian reserves are considered acceptable when used with design features that are intended to protect soils and other resources (see the proposed design features for hydrology, fisheries, and soils in Chapter 2 of the project EIS).

Fire crews would construct firelines by hand where natural barriers do not exist and these would provide a starting point for ground-based ignitions and holding crews. In addition, approximately 4.61 miles (approximately 4 acres) of 8-foot-wide dozer lines would be constructed or improved in order to facilitate the implementation of prescribed fire.

Crews would ignite prescribed fires on the ground with handheld torches or from the air using helicopters. Prescribed fire may be conducted any time of year as long as it is outside of site specific Limited Operation Periods and prescriptions addressed within a site-specific burn plan. Desired flame lengths in the treatment areas would vary from 0 to 8 feet within the threat zone of the wildland-urban interface and as resource objectives require in other areas.

On approximately 83 acres around identified bald eagle nest sites, a combination of hand thinning, brush cutting, pruning, piling, and burning of hand piles would be accomplished to reduce fuels that could contribute to a crown fire in order to protect current and future bald eagle

nest sites from a severe wildfire. Desired flame lengths in these treatment areas range from 0 to 4 feet. Treatments would extend approximately 300 feet around the perimeter of identified nest sites and would not be completed during the season when bald eagles are nesting unless otherwise approved by the district wildlife biologist (see Project Design Features below).

### **Alternative 3**

This alternative was developed in response to comments requesting that Forest Plan standards are followed for dead and downed wood throughout the project area – in essence, the Forest Plan amendment proposed in Alternative 2 is not implemented.

A preliminary analysis indicated that, of the 26,284 acres within Management Prescriptions II and III (for which the amendment was proposed), only about 4,712 acres currently meet Forest Plan standards for dead and downed wood. Of those acres, only about 6 acres would meet Forest Plan standards following treatment. As a consequence, the IDT dropped all of the lands in those two management prescriptions from proposed fuels treatment under Alternative 3. In addition, portions of other management prescriptions were also dropped because they were scattered and isolated from the remainder of the project area and/or too small to warrant treatment.

In addition, no dozer line would be constructed under this alternative, and no fuels treatment would occur around known bald eagle nest sites or the Campbell Creek recreation residences.

**Table 4.** Summary of Green-Horse project treatments with pre- and post-treatment CWHR type

<b>Treatment Prescription</b>	<b>Acres</b>	<b>Pre-treatment CWHR type</b>	<b>Post Treatment CWHR</b>
Alt. 2 Prescribed Burning and Hand piling	41,622	Douglas-fir Ponderosa Pine Montane Hardwood Montane Hardwood - Conifer Sierran Mixed Conifer Mixed Chaparral Montane Chaparral  Size classes 2, 3, 4 Canopy cover S, P, M, D	Douglas-fir Ponderosa Pine Montane Hardwood Montane Hardwood - Conifer Sierran Mixed Conifer Mixed Chaparral Montane Chaparral  Size classes 2, 3, 4 Canopy cover S, P, M, D
Alt. 3 Prescribed Burning and Hand piling	13,275	Douglas-fir Ponderosa Pine Montane Hardwood Montane Hardwood -	Douglas-fir Ponderosa Pine Montane Hardwood Montane Hardwood -

		Conifer Sierran Mixed Conifer Mixed Chaparral Montane Chaparral  Size classes 2, 3, 4, 5 Canopy cover S, P, M, D	Conifer Sierran Mixed Conifer Mixed Chaparral Montane Chaparral  Size classes 2, 3, 4, 5 Canopy cover S, P, M, D
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Canopy Cover classifications: S=Sparse Cover (10-24% canopy cover); P= Open cover (25-39% canopy cover); M= Moderate cover (40-59% canopy cover); D= Dense cover (60-100% canopy cover). Tree size classes: 1 = Seedling (<1") dbh; 2 = Sapling (1"-5.9" dbh); 3=Pole (6"-10.9" dbh); 4 = Small tree (11"-23.9" dbh); 5 = Medium/Large tree (≥24" dbh); 6 =Multi-layered Tree (CDFG 2008).

#### 4. Project Effects on Management Indicator Assemblage Habitat

The following section documents the effects of the Green-Horse project on habitat components of six habitat assemblages within the project area; Openings and Early Seral, Late Seral, Snags and Downed Logs, Hardwood, Riparian and Chaparral management indicator assemblages. Field verification of the project area and 2010 National Agricultural Imagery Program (NAIP) imagery were used in conjunction with the RSL (2007) Existing Vegetation (EVEG) data<sup>13</sup> for the purpose of analyzing the current status of the vegetation in the analysis area. In addition, the following analysis used the best available science as well as local knowledge and expertise of district and forest personnel for site specific data for project level analysis.

For each assemblage potentially affected by the project, the biologist evaluates a species strongly associated with the habitat components that define the assemblage. The species analysis is used to provide further context to project effects and the relationship of project habitat impacts to Forest level trends. Table 5 summarizes the pre- and post treatment assemblage acres.

Both action alternatives propose burning under the same prescriptions, using the same project design features and protective measures, and the same habitat types would be affected.

The key differences pertinent to this analysis between the two action alternatives are that for Alternative 3; fewer acres would be treated, fuel within bald eagle territories would not be treated, and dozer line would not be constructed or reconstructed.

<sup>13</sup> USDA 2007 EVEG. This 2007 Existing Vegetation (EVEG) polygon layer completed Classification and Assessment with LANDSAT of Visible Ecological Groupings (CALVEG) map product at a scale of 1:24,000; it updates and revises the 2003 data for Shasta-Trinity NF administrative areas, including private land inholdings.

**Table 5: Summary of pre- and post-treatment terrestrial management indicator assemblage habitat within areas proposed for treatment.**<sup>14</sup>

<b>Assemblage</b>	<b>Pre-treatment Habitat Acres* (No Action)</b>	<b>Post Treatment Habitat Acres Alternative 2</b>	<b>Post Treatment Habitat Acres Alternative 3</b>	<b>Change in MIA Habitat Acres</b>
Openings and Early Seral	1,956	1,956	224	0
Late Seral	5,883	5,883	3,273	0
Snag and Down Log	37,586	37,586	12,566	0
Hardwood	12,690	12,690	5,101	0
Riparian	686**	686**	191	0
Chaparral	3,777	3,777	481	0

\*Forest Service ownership only.

\*\* Acres derived from Green-Horse Fire/Fuels/Vegetation Report – CWHR categories within project area; derived from EVEG 2007.

## **Openings and Early Seral Stage**

### **Wildlife Assemblage (Nashville warbler)** \_\_\_\_\_

This assemblage is defined as: CWHR tree sizes seedlings (<1” dbh), saplings (1”-5.9” dbh), pole-sized (6”-10.9” dbh), and small trees (11”-23.9” dbh) of blue oak-foothill pine, closed cone pine-cypress, Douglas fir, eastside pine, Jeffrey pine, Klamath mixed conifer, lodgepole pine, montane hardwood conifer, ponderosa pine, red fir, Sierran mixed conifer, and white fir CWHR habitat types.

### **Habitat/Species Relationship**

The Nashville warbler is found in early seral, open, brushy stands of forests and woodlands. The species is strongly associated with the small tree and brush habitat components that are likely to be affected by the project. This species nests on the ground under dense brush in openings within young forests and woodlands (CDFG 2008). Preferred Nashville warbler nesting habitat includes CWHR tree sizes: saplings (1-5.9 inches dbh), pole-sized (6-10.9 inches dbh), and small trees (11-23.9 inches dbh), with sparse or open canopy cover (CDFG 2008).

## **Project level Effects Analysis – Openings and Early Seral Assemblage**

This analysis discloses project effects on the amount of Openings and Early Seral assemblage habitat available (quantitative), and effects of the project on the quality of assemblage habitat in relation to a representative species (Nashville warbler).

<sup>14</sup> The Late Seral and Early Seral assemblages are defined by specific management indicator assemblage definitions, so acreages may differ from late seral and early seral habitat in other reports.

*Habitat Factor(s) for the Analysis:*

- (1) Quantitative: Acres with changes in amount of Openings and Early Seral assemblage habitat
- (2) Qualitative: Acres with changes in CWHR tree size class.
- (3) Qualitative: Acres with changes in tree canopy cover.

*Current Condition of the Habitat Factor(s) in the Project Area*

Currently, the project area consists of a variety of habitat types that are present in various seral stages within multiple vegetative types due, in large part, to the wildfires that have occurred in the last 15-20 years.

Within Alternative 2, there are 1,956 acres are defined as Openings and Early Seral assemblage habitat distributed in pockets throughout the treatment area. Alternative 3 contains 224 acres, also scattered throughout the area. CWHR habitat types in the project units include Douglas fir, ponderosa pine, montane hardwood conifer, and Sierran mixed conifer. The overall canopy cover in the units is highly variable and is dependent upon multiple factors such as slope, aspect, elevation and proximity to water. NAIP imagery and EVEG (2007) analysis show that all canopy closure categories are represented in some proportion within areas delineated for both Alternative 2 and 3, though the majority of the forested areas fall within either Dense cover (60-100% canopy cover) category. Nashville warblers prefer young stands with more open canopies within Openings and Early Seral assemblage habitat.

**Effects of Alternative 1 (No Action)**

With the No Action Alternative, wildland fire risk and fire hazard would increase as untreated fuels continue to accumulate. In the event of a large, severe wildfire the likely result would be higher vegetation severity, as a wildfire is likely to occur under more extreme conditions<sup>15</sup>.

**Effects of Alternative 2 and 3**

*Direct and Indirect Effects to Assemblage Habitat*

Scattered areas within both of the action alternatives consist habitat conditions that meet the management indicator assemblage definition of Openings & Early Seral habitat. The proposed action treatments will impact approximately either 1,956 acres, or 224 acres, of Openings and Early Seral assemblage habitat; though neither alternative will result in a change to the total acres of the assemblage type, as this assemblage includes all canopy cover classes within early seral stands.

In addition, CWHR tree size class will not be changed as a result of the project because treated areas would continue to be characterized as size class 2, 3 or 4 (depending on stand density and cover) after treatment, and these size classes are included under Openings and Early Seral assemblage. Less than 0.01% of Forest wide Openings and Early Seral assemblage habitat

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<sup>15</sup> See Fire/Vegetation/Air Quality Report for the Green-Horse project.

would be impacted by project implementation. There will be no immediate acreage change or conversion into another assemblage as a result of this project. As a result, although the treated stands will have a more open understory, they will continue to provide habitat for species associated with early seral stands.

**Table 6. Direct effects on the Openings and Early Seral assemblage.**

Analysis factors	No Action	Alternative 2	Alternative 3
Acres of Openings & Early seral assemblage within treatment units	1,956	1,956	224
Tree size class	2, 3, 4	2, 3, 4	2, 3, 4
Acres of Sparse to Moderate Canopy Cover	1,956	1,956	224
Total Acres with Reduction in Canopy Cover	0	0	0

#### *Cumulative Effects to Assemblage Habitat*

There is no change in the total amount of Openings and Early Seral assemblage as a result of this project, so there will be no cumulative effects.

#### *Influence of Project Effects to Habitat Status and Trends at the Forest scale*

There are currently 801,000 acres of Openings and Early Seral assemblage habitat on National Forest System lands on the Shasta-Trinity National Forest. Within the last decade, the trend for Openings and Early Seral assemblage on the Shasta-Trinity National Forest is steady at 36% of National Forest lands.<sup>16</sup>

Although not reflected in this recorded trend for assemblage habitat on the Shasta-Trinity National Forest, Northwest Forest Plan monitoring findings reported a net change over the last decade in the amount of older forests<sup>17</sup> due to the gradual growth of trees into the lower end of the 20 inch diameter class (Haynes et al. 2006). Across the Northwest Forest Plan area, the actual rate of net increase in older forest was 1.9 percent from 1994-2003, and attributed largely to growth and development of natural stands with quadratic mean diameter greater than 17.7 inches during the 1990's.<sup>18</sup> Researchers report that the increase in older forests during this period was due to a bulge in the size-class distribution of forests with diameters just below the 20-inch class, and estimate the accumulation of older forests will decline as the bulge moves into the greater than 20-inch class. Because the Forest classification of Late Seral assemblage habitat includes stands with mean diameters greater than 24 inches, these data predict that Forest wide trends would show an increase in Late Seral and decrease in Openings and Early Seral assemblage habitat in the near future. Because the effects to vegetation due to prescribed fire will be variable across the project area, it is difficult to predict how long term habitat effects due to the project may influence Forest level trends. One of the major goals of the proposed actions is to reduce understory vegetation such as small trees and brush within forested stands. Where that occurs, the project would increase the growth of remaining trees and the development of late

<sup>16</sup> Based on GNN vegetation analysis of assemblages as defined by CWHR habitat types.

<sup>17</sup> Older forest encompasses both mature and old-growth stages and is defined differently than the Forest management indicator assemblages. Older forests are defined in the Northwest Forest Plan by mean diameter of over 20 inches, and the Late Seral assemblage is defined by mean diameter of over 24 inches.

<sup>18</sup> See Haynes et al. (2006), Chapter 6 and Moeur et al. (2005).

seral habitat from Openings and Early Seral; thereby contributing to the expected Forest level trend for these assemblages. However, the precise location and extent of these long term project effects cannot be determined at this time.

**Table 7. Forest wide Openings and Early Seral assemblage over time.**

Assemblage	Amount of assemblage habitat in 1994 (acres)	Percent of Forest in Openings and Early Seral assemblage in 1994	Amount of assemblage habitat in 2007 (acres)	Percent of Forest in Openings and Early Seral assemblage in 2007
Openings & Early Seral	796,000	36%	801,000	36%

*Direct and Indirect Effects to Habitat for Nashville Warbler*

Moderate and high quality reproductive habitat for the Nashville warbler may be affected by the proposed activities. Alternative 2 would have short term impacts on approximately 1,956 acres of habitat for the Nashville warbler, and Alternative 3 on approximately 223 acres, of which the quality is highly variable. In the short term, the project may decrease the habitat suitability of the treatment units for the Nashville warbler by consuming brush and brush skeletons within the young stands, including the loss of some young conifer trees. In the long term, habitat would be improved by regenerating young and early seral vegetation through the use of fire. Older, more decadent brush is highly susceptible to high intensity fire behavior and at risk from loss during wildfire. Nashville warblers use much of this at risk habitat type; therefore the regeneration of new growth and promotion of young, early seral vegetation will provide both short term and long term benefits.

*Relationship of Project-Level Habitat Impacts to Larger Nashville Warbler Habitat Trends*

As described above, Forest level trend in the amount of Openings and Early Seral assemblage habitat is steady (Table 7). In the long run, it is likely that early seral assemblage will decline slightly and Late Seral assemblage will increase slightly due to current and foreseeable forest practices of retaining and encouraging development of late seral forest.

This project would have potential negative, short-term effects and beneficial long-term effects on the amount of moderate and high quality Nashville warbler habitat available in the project area. Short-term effects of the proposed prescribed burning would consist of burned brush, brush skeletons and small woody debris and duff within suitable habitat. Long-term effects of this would reduce the risk of adverse effects from wildfire to Nashville warbler habitat that currently exists in the project area.

This would not contribute to the potential Forest wide trend for early seral habitat. However, typical practices on private timber land and the occurrence of wildfire on both federal and private lands within national forest boundaries will continue to create early seral assemblage habitat and Nashville warbler habitat of a varying quality and distribution. Project effects would be realized on a small scale in relation to the amount and quality of habitat available Forest wide.

Population trends for the Nashville warbler are tracked and compiled at the Forest level.<sup>19</sup> These data indicate a potential decline in species occurrence within the BBS strata that overlap the Shasta-Trinity National Forest, but the decline is weakly supported by statistical analysis (Sauer et al. 2008). In light of best available population data, project effects to habitat, and the ongoing contribution of habitat from wildfires and private timber harvest, the project is not likely to result in any meaningful change to population trends and habitat availability for the Nashville warbler.

## **Late Seral**

### **Wildlife Assemblage (brown creeper)**

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This assemblage is defined as: CWHR tree size medium (11-24 inches dbh) and large ( $\geq 24$  inches dbh) of blue oak-foothill pine, closed cone pine-cypress, Douglas fir, eastside pine, Jeffrey pine, Klamath mixed conifer, lodgepole pine, montane hardwood conifer, ponderosa pine, red fir, Sierran mixed conifer, and white fir CWHR habitat types.

### **Habitat/Species Relationship**

The brown creeper occupies dense, mature stands of conifer and conifer hardwood habitats, with a relatively closed canopy (primarily moderate to dense canopy cover for high quality habitat; CDFG 2008). The species is strongly associated with large trees and the dense canopy cover that is likely to be affected by the project. This species nests behind loose bark in large trees, and more rarely in tree cavities (CDFG 2008). Preferred brown creeper nesting habitat includes CWHR tree sizes 4 (11-24 inches dbh) and 5 ( $\geq 24$  inches dbh), with moderate or dense canopy cover (CDFG 2008).

### **Project-level Effects Analysis – Late Seral Assemblage**

This analysis discloses project effects on the amount of Late Seral assemblage habitat available (quantitative), and effects of the project on the quality of assemblage habitat in relation to a representative species (brown creeper).

#### *Habitat Factor(s) for the Analysis:*

- (1) Quantitative: Acres with changes in amount of Late Seral assemblage habitat
- (2) Qualitative: Acres with changes in CWHR tree size class.
- (3) Qualitative: Acres with changes in tree canopy cover.

#### *Current Condition of the Habitat Factor(s) in the Project Area*

Within project treatment units, 5,883 acres (Alt. 2) or 3,273 acres (Alt. 3) fall under the Late Seral assemblage. CWHR habitat types in the project units include: Douglas fir, closed cone pine-cypress, ponderosa pine, montane hardwood-conifer, and Sierran mixed conifer. The overall canopy cover in the units is highly variable and is dependent upon multiple factors. NAIP imagery and EVEG (2007) analysis show that all canopy closure categories are represented in some proportion throughout the units, though the majority of the area falls within Dense cover (60-100% canopy cover) category.

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<sup>19</sup> See STNF Forest level MI report

The majority of the later seral habitat in the project area is more moderate quality brown creeper habitat. Only about 15% of the late seral habitat identified in Alternative 2 contains the largest size class of tree (class 5 >24" dbh), and the rest is made of smaller to medium size class trees with moderate to dense canopy cover. For Alternative 3, approximately 7% of the late seral is made up of size class 5 trees and moderate to dense canopy cover.

## Effects of Alternative 2 and 3

### *Direct and Indirect Effects to Assemblage Habitat*

Alternative 2 proposes to prescribe burn 5,883 acres, and Alternative 3 proposes 3,273 acres, that meet the definition for Late Seral habitat assemblage. The CWHR tree size class will not be changed as a result of the project because remaining trees will be characterized as size class 4 and 5 after treatment, and this falls within the Late Seral habitat assemblage definition. Canopy cover will not be appreciatively reduced as a result of the project, and this will not result in a change in assemblage type because assemblage habitat includes all canopy closure classes of late seral trees. As a result, treated stands will continue to provide habitat for species associated with late seral stands. There will be no immediate acreage change or conversion into another assemblage as a result of this project. Alternative 2 would affect approximately 0.7% of the Forest wide Late Seral assemblage habitat; Alternative 3 would affect approximately 0.4%.

**Table 8. Direct effects on the Late Seral assemblage at the project scale.**

<b>Analysis factors</b>	<b>No Action</b>	<b>Alternative 2</b>	<b>Alternative 3</b>
Acres Late Seral assemblage within treatment units	5,883 acres	5,883 acres	3,273 acres
Acres of change in CWHR habitat tree size class 4 and 5	0	0	0
Acres of change in tree canopy cover	0	0	0
Canopy cover	Moderate and Dense	Moderate and Dense	Moderate and Dense

### *Cumulative Effects to Assemblage Habitat*

There is no change in the amount of Late Seral assemblage habitat from the project, so there will not be cumulative effects on the assemblage habitat due to this project.

### *Influence of Project Effects to Habitat Status and Trends at the Forest scale*

Based on the best available data used to track Forest wide management indicator assemblage habitat,<sup>20</sup> there are currently approximately 790,000 acres of Late Seral assemblage habitat on the Shasta-Trinity National Forest. Within the last decade, the recorded trend for amount of Late Seral assemblage habitat on the Forest is steady at 36% of habitat on Shasta-Trinity National Forest lands. Table 9 summarizes the trend in Late Seral assemblage over the last decade on the National Forest.

As described above for Openings and Early Seral assemblage, Northwest Forest Plan effectiveness monitoring findings report a net change over the last decade in the amount of older

<sup>20</sup> The Forest utilizes data layers developed for Northwest Forest Plan effectiveness monitoring to track Forest wide assemblage habitat. More information is in Habitat Status and Trend section near beginning of this document.

forests<sup>21</sup> due to the gradual growth of trees into the lower end of the 20 inch diameter class. Analysis in the Northwest Forest Plan monitoring report found that areas of older forests are stable and expanding, and expectations are for continued increases.<sup>22</sup> Even though this trend reported at the Northwest Forest Plan level is not reflected definitively in current Shasta-Trinity assemblage habitat trends for early and late seral habitat, it is likely that Forest wide trends would show an increase in Late Seral and associated decrease in Openings and Early Seral assemblage habitat in the near future (Haynes et al. 2006).

**Table 9. Forest wide Late Seral assemblage over time.**

Assemblage	Amount of assemblage habitat in 1994 (acres)	Percent of Forest in late seral assemblage in 1994	Amount of assemblage habitat in 2007 (acres)	Percent of Forest in late seral assemblage in 2007
Late Seral	785,000	36%	790,000	36%

*Direct and Indirect Effects to Habitat for Brown Creeper*

Dense canopy cover in Douglas fir and Sierran mixed conifer CWHR habitat types with tree size class 4 and 5 (as occurs in the project units before and after treatment) provides high suitability nesting habitat for brown creepers. High quality reproductive habitat for the brown creeper may be affected by the proposed activities. Alternative 2 would have short term impacts on approximately 5,883 acres of habitat for the brown creeper, and Alternative 3 would impact 3,273 acres, for which all is of highly variable quality. In the short term, the project may impact habitat for this species by rejuvenating the understory by consuming excessive duff and smaller diameter vegetation, allowing more sunlight to reach the ground. This may in turn allow for more vegetative diversity and structure within the understory which may translate to an increase in the abundance of small insects (prey) that thrive on herbaceous growth. The habitat would continue to be suitable after treatment.

Studies have shown that prescribed fire can increase the diversity and abundance of insects within treated areas.<sup>23</sup> Short term effects of the project on brown creeper habitat may be beneficial as the influence of prescribed fire within the understory of the late seral habitat may enhance vegetative and stand structural diversity, which may translate into increased insect diversity with increased overall abundance and availability of insectivorous prey<sup>24</sup>. Long term impacts to brown creeper habitat would be evident as the currently suitable habitat present in the project area becomes more resilient to fire and is returned to a more natural fire cycle.

In the long term, implementation of prescribed fire would reduce the risk of adverse effects from wildfire to brown creeper habitat that currently exists in the project area. Effects to vegetation from the proposed activities are expected to be considerably less than with a wildfire, as fires

<sup>21</sup> Older forest encompasses both mature and old-growth stages and is defined differently than the Forest management indicator assemblages. Older forests are defined in the Northwest Forest Plan by mean diameter of over 20 inches, and the Late Seral assemblage is defined by mean diameter of over 24 inches. This analysis uses Northwest Forest Plan data, but categorizes the data according to Forest management indicator assemblage definitions (Table 1).

<sup>22</sup> See Haynes et al. (2006), Chapter 6 and Moeur et al. (2005).

<sup>23</sup> Pilliod et al 2006; Machmer 2002

<sup>24</sup> Pilliod et al 2006; Bock and Bock 1983; Morrison and Adams 1993;Hejl et al 2002;Machmer 2002

would be ignited under prescriptive conditions. In addition, the proposed activities would trend vegetation composition and structure, as well as wildfire severity and behavior toward historic norms.

#### *Relationship of Project-Level Habitat Impacts to Larger Brown Creeper Habitat Trends*

As described above, Forest level trends show a steady trend in the amount of Late Seral habitat assemblage (Table 9). In the long run, it is likely that early seral assemblage will decline slightly and Late Seral assemblage will increase slightly due to forest practices of retaining and encouraging development of late seral forest.

Typical practices on private timber land will continue, so no significant contributions to Late Seral assemblage are likely to occur outside of Forest boundaries.

Population trends for the brown creeper are tracked and compiled at the Forest level. These data indicate a fairly stable population on the Forest, with a slight lean towards a decline, but the decline is not strongly supported by statistical analysis (Sauer et al. 2008). In light of best available population data, project effects to habitat, and Forest level habitat trends, the project is not likely to result in any meaningful change to population trends and habitat availability for the brown creeper.

### **Snags & Down Log**

#### **Habitat Assemblage (red-breasted nuthatch)**

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This assemblage is defined as conifer and hardwood habitats with substantial snags and down logs.

#### **Habitat/Species Relationship**

The red-breasted nuthatch is strongly associated with snags. This species nests in cavities that they excavate in rotted wood, especially snags (CDFG 2008). Preferred red-breasted nuthatch nesting habitat includes CWHR tree sizes medium/large ( $\geq 24$  inches dbh) with sparse, open, moderate or dense canopy cover (CDFG 2008).

#### **Project-level Effects Analysis – Snag and Down Log Assemblage**

This analysis discloses project effects on the amount of Snag and Down Log assemblage habitat available (quantitative), and effects of the project on the quality of assemblage habitat in relation to a representative species (red-breasted nuthatch).

##### *Habitat Factor(s) for the Analysis:*

- (1) Quantitative: Acres with changes in amount of Snag and Down Log assemblage habitat
- (2) Qualitative: Acres with changes in density of snag and/or down logs

##### *Current Condition of the Habitat Factor(s) in the Project Area:*

The project area encompasses 41,622 acres, of which approximately 37,586 acres (for Alternative 2) and 12,566 acres (for Alternative 3), have the potential to represent Snag and Down Log coniferous and hardwood habitat assemblage. Currently, the project area consists of a variety of habitat types that are present in various seral stages within multiple vegetative types,

some of which is a result of multiple wildfires that have occurred in the last 15-20 years. As a consequence of these wildfires, an abundance of snag and downed logs have accumulated in an uneven distribution directly related to the location of these fires.

No stand exam data has been collected, as no timber harvest has been planned in the project area for many years. Therefore, no quantitative snag or downed log data exists that would identify snags or downed logs on a per acre basis. Field reviews during project planning and analysis of the project provide a qualitative assessment of the general abundance of snags and downed logs in the project area, which can aid in the assessment of the availability of snags/downed logs as a habitat assemblage.

### **Effects of Alternatives 2 and 3**

#### *Direct and Indirect Effects to Assemblage Habitat*

Much of the project area consist of habitat conditions that meet the management indicator assemblage definition of Snag and Down Log habitat. Areas where past fires have caused high tree mortality and overstory loss provide abundant snags and down logs. Both snags and down logs are representative of the composition of the stand in which they occur, as the cause of the mortality to the trees was wildfire.

Stands of larger overstory trees will invariably contain a proportionate amount of naturally occurring snags and down logs. In addition, due to the presence of a highly fluctuating lake level that bisects and surrounds the project area, trees within the zone of inundation have died, leaving behind a profusion of snags in areas such as the northern end of the Pit River Arm of the lake.

All of these areas described above provide an abundance of opportunities for snag dependent wildlife, including the red-breasted nuthatch. Acres described in the tables for Snags and Down Log habitat assemblage represent forested lands with the capacity to produce an overstory tree that would then become a snag or down log. Brush fields and other open areas devoid of trees were excluded from the acreage totals.

The CWHR tree size class will not be changed as a result of the project because project implementation will not affect the size class of tree within the affected stands. In addition, the levels of snags and downed logs will not be reduced below levels appropriate for the habitat type.

Prescribed burning is not expected to reduce the suitability of the habitat assemblage for snag and downed logs, as all down logs/snags would not be consumed in a given burn. Each burn would be conducted within prescriptions specifically designed to consume the smaller woody debris, but not fully consume the larger size classes of fuel. It is this larger size class of snag and log that is utilized most by the species associated with these habitat components. If snags become weakened by prescribed fire and subsequently fall, they would remain on the ground, thereby remaining within the Snag and Downed Log habitat assemblage.

As a result, treated stands will continue to provide habitat for species associated with Snag and Down Logs habitat assemblage. There will be no immediate acreage change or conversion into another assemblage as a result of this project. The proposed project would affect less than 6%

(Alternative 2) or less than 2% of the overall percentage of the Forest wide Snag and Down Log assemblage habitat described below (Table 11).

**Table 10: Direct effects on the Snag and Downed Log assemblage habitat at the project scale**

Analysis factors	No Action	Alternative 2	Alternative 3
Acres Snag and Downed Log assemblage within treatment units	37,586 acres	37,586 acres	12,566 acres
Acres of change in all CWHR habitat tree size classes	0	0	0
Acres of change in all categories of canopy cover	0	0	0

*Cumulative Effects to Assemblage Habitat*

There is no change in the amount of Snag and Downed Log assemblage habitat from the project, so there will not be cumulative effects on this assemblage habitat due to this project.

*Influence of Project Effects to Habitat Status and Trends at the Forest scale*

The Snag and Downed Log assemblage is defined as conifer and hardwood habitats with substantial snags and down logs. The habitat components defining the assemblage (snags and down logs) also occur within the other assemblages and are evaluated at the project level using site-specific data. At the Forest level, the amount of assemblage habitat is tracked using annual aerial survey data which provides information about forest mortality due to insect and disease, and wildfire data. Because snags and down logs are habitat components found within the other assemblages, the amount of Snag and Down Log assemblage tracked at the Forest level is known to represent only a portion of the habitat that provides snags and down logs throughout the Forest.

Since 1994 snags have been recruited in large pulses by disease mortality and fire on over 591,000 acres of National Forest System lands in the Shasta-Trinity National Forest. Snags are not permanent features on the landscape (Cluck and Smith 2007, Landram et al. 2002), and when they fall they contribute to the log component and continue to provide Snag and Down Log assemblage habitat. Snags and logs are known to be deficient in plantations due to past management practices; therefore, there is a deficiency of snags on 67,700 acres of National Forest System Lands. Also, snags and logs are not usually retained on private timber land, so Snag and Down Log assemblage is likely restricted to National Forest System lands.

**Table 11. Forest wide trends in Snag and Down Log assemblage habitat.**

Assemblage	Total amount of assemblage contributed since 1994 (acres)	Gain due to wildfire since 1994 (acres)	Gain due to disease since 1994 (acres)	Acres of Snag Deficiency
Snag and Down Log	591,100	177,300	413,800	67,700

As shown in Table 11, Snag and Down Log assemblage habitat continues to increase over time due to wildfire events and insect and disease outbreaks. Contributing forces to the recruitment of snags involves the overall health and flammability of forests. The Forest Service monitors forest health through field reconnaissance and annual aerial surveys. Aerial surveys report areas containing current-year conifer and hardwood mortality, defoliation, and other damage<sup>25</sup>.

Any decreases in the snag habitat component would be localized and due to vegetation and fuels management actions such as linear fuel management zones or private forestry where Forest Plan snag retention guidelines do not apply. The amount of snag and down log habitat may also be reduced due to intense wildfires that consume some snags and logs, and slowly due to natural decomposition.

Implementation of this project would not meaningfully reduce the amount of Snag and Down Log assemblage habitat at the Forest level. The extent of effects is small relative to the levels of available snags and downed logs in the project area; and negligible considering ongoing snag and down log recruitment due to insect and disease activity in the area. Typical practices on private timber land will continue to create a lack of snags and logs on private lands. The occurrence of disease outbreaks and wildfire are likely to continue at the current rate because there are still large areas with high fuel loading and management of diseased stands occurs at small scales.

In the long term, implementation of prescribed fire would reduce the risk of adverse effects from wildfire to red-breasted nuthatch habitat that currently exists in the project area.

#### *Direct and Indirect Effects to Habitat for Red-breasted Nuthatch*

Moderate and dense canopy cover in Douglas fir and Sierran mixed conifer CWHR habitat types with tree size classes 4 and 5 (as occurs within units before and after the project) provides moderate and high suitability nesting habitat for red-breasted nuthatches as long as the stands include snags. The project area as a whole will continue to provide habitat of a wide range of suitability for the red-breasted nuthatch after treatment. Treatments will occur in highly variable vegetative conditions, but it can be assumed that where currently suitable habitat exists, it will continue to persist post-treatment, as prescribed fire would not alter the suitability of the stands for red breasted nuthatches. In the short term, the project will not affect habitat suitability for the red-breasted nuthatch because of the abundant snags that will remain on the landscape after project implementation. In the long term, implementation of prescribed fire would reduce the risk of adverse effects from wildfire to red breasted nuthatch habitat that currently exists in the project area. Impacts from the proposed activities are expected to be considerably less than what would result from a wildfire, as proposed burning would be implemented under prescriptive conditions.

#### *Relationship of Project-Level Habitat Impacts to Larger Red-breasted Nuthatch Habitat Trends*

Forest wide Snag and Down Log assemblage habitat continues to increase over time, and late seral habitat (which provides recruitment of snags and down logs) has a current trend of steady with potential for future increases. Because the project affects only a small fraction of the red-

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<sup>25</sup> More information is found at <http://www.fs.fed.us/r5/spf/fhp/fhm/aerial/index.shtml>

breasted nuthatch habitat available Forest wide, it is not likely to have any meaningful influence on Forest wide habitat trends.

Population trends for the red-breasted nuthatch are tracked and compiled at the Forest level. These data indicate a potential increase in species occurrence on the National Forest, and this increase is supported by statistical analysis in the Pitt-Klamath strata and the South Pacific Rainforest strata that occur on the Forest, as well as range-wide (Sauer et al. 2008). In light of best available population data, project effects to habitat, and Forest level habitat trends, the project is not likely to result in any meaningful change to population trends and habitat availability for the red-breasted nuthatch.

## **Hardwood**

### **Wildlife Assemblage (white-breasted nuthatch)** \_\_\_\_\_

This assemblage is defined as all tree sizes and all canopy cover classes of montane hardwood, blue oak woodland, and valley oak woodland CWHR habitat types.

### **Habitat/Species Relationship**

The white-breasted nuthatch occupies hardwood habitats and hardwood-conifer habitats (primarily CHWR tree size 4 and 5 for high quality habitat; CDFG 2008). The species tends to be associated with large oaks. This species nests in cavities in large trees or snags excavated by themselves or by woodpeckers (CDFG 2008). Preferred white-breasted nuthatch nesting habitat includes CWHR tree sizes 4 (11-24 inches dbh) and 5 ( $\geq 24$  inches dbh) in hardwood woodland or hardwood conifer stands (CDFG 2008).

### **Project-level Effects Analysis – Hardwood Assemblage**

This analysis discloses project effects on the amount of Hardwood assemblage habitat available (quantitative), and effects of the project on the quality of assemblage habitat in relation to a representative species (white-breasted nuthatch).

#### *Habitat Factor(s) for the Analysis:*

- (1) Quantitative: Acres with changes in amount of Hardwood assemblage habitat
- (2) Qualitative: Acres with changes in CWHR tree size class
- (3) Qualitative: Acres with changes in hardwood canopy cover

#### *Current Condition of the Habitat Factor(s) in the Project Area*

This project occurs on 12,690 acres (Alternative 2) or 5,101 acres (Alternative 3) of the Hardwood habitat assemblage as represented by CWHR habitat type of montane hardwood. This habitat is comprised mainly of canyon live oak, brewer's oak and black oak; with moderate (40-59%) and high (60-100%) canopy closure; and tree size classes of 3, 4, and 5.

## **Effects of Alternative 2 and 3**

### *Direct and Indirect Effects to Assemblage Habitat*

The project area currently consists of habitat conditions that meet the management indicator assemblage definition of Hardwood assemblage habitat. The Green-Horse project proposes to prescribe burn within 12,690 acres of the Hardwood habitat assemblage with Alternative 2, and 5,101 acres with Alternative 3. The CWHR tree size class of the treated stands will not be changed as a result of the project because remaining trees will continue to be characterized as size class 3, 4 and 5 after treatment, and this falls within the Hardwood assemblage definition. In general, canopy cover will not be appreciatively reduced as a result of the project, and this will not result in a change in assemblage type because assemblage habitat includes all canopy closure classes within hardwood stands. As a result, treated stands will continue to provide habitat for species associated with hardwood habitat. There will be no immediate acreage change or conversion into another assemblage as a result of this project. The proposed project would affect less than 3.5% (Alternative 2) or 1.5% (Alternative 3) of the Forest wide Hardwood assemblage habitat.

**Table 12: Direct effects on the Hardwood assemblage at the project scale.**

Analysis factors	No Action	Proposed Action	Alternative 3
Acres Hardwood assemblage within treatment units	12,690 acres	12,690 acres	5,101 acres
Acres of change in CWHR habitat tree size class	0	0	0
Acres of change in tree canopy cover	0	0	0
Canopy cover	All	All	All

*Cumulative Effects to Assemblage Habitat*

There is no change in the amount of Hardwood assemblage habitat from the project, so there will not be cumulative effects on the assemblage habitat due to this project.

*Influence of Project Effects to Habitat Status and Trends at the Forest scale*

There are currently 323,000 acres of Hardwood assemblage habitat on National Forest System lands in the Shasta-Trinity National Forest. Within the last decade, the trend for Hardwood assemblage on the Forest is steady at 15% of habitat on National Forest system lands.

In the long term, this proposed action would not affect Forest wide trends because it does not affect the amount of Hardwood assemblage habitat available.

**Table 13. Forest wide Hardwood assemblage over time.**

Assemblage	Amount of assemblage habitat in 1994 (acres)	Percent of Forest in hardwood assemblage in 1994	Amount of assemblage habitat in 2007 (acres)	Percent of Forest in hardwood assemblage in 2007
Hardwood	334,000	15%	323,000	15%

*Direct and Indirect Effects to Habitat for White-breasted Nuthatch*

The Hardwood assemblage habitat in the project units consists of montane hardwood habitat with CWHR size class 3, 4 and 5 trees and moderate to high canopy cover. This type of habitat provides moderate to high quality nesting habitat for the white-breasted nuthatch. The hardwood habitat will maintain these characteristics after treatments, thus the hardwood habitat will

continue to provide moderate and high quality reproductive white-breasted nuthatch habitat. The project will have no adverse effects to white-breasted nuthatch habitat availability.

#### *Relationship of Project-Level Habitat Impacts to Larger White-breasted Nuthatch Habitat Trends*

As described above, the Hardwood assemblage habitat trend at the Forest level is steady (Table 13). Implementation of this project would not affect the Forest wide steady trend in Hardwood assemblage habitat, because no change in amount of assemblage habitat will occur. Project effects are consistent with Forest level trends that indicate Hardwood assemblage habitat is being maintained over time. Typical practices on private timber land will continue, so no significant contributions to Hardwood assemblage are likely to occur outside of Forest boundaries.

Population trends for the white-breasted nuthatch are tracked and compiled at the Forest level. These data indicate a potentially increasing population on the Forest. This increase is supported by statistical analysis in the Pitt-Klamath BBS strata (Sauer et al. 2008). In light of best available population data, project effects to habitat, and Forest level habitat trends, the project is not likely to result in any meaningful change to population trends and habitat availability for the white-breasted nuthatch.

## **Riparian**

### **Wildlife Assemblage (yellow warbler)**

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This assemblage is defined as all tree sizes and all canopy cover classes of montane riparian, valley foothill riparian, and aspen CWHR habitat types.

### **Habitat/Species Relationship**

The yellow warbler occupies streamside riparian habitats with shrubby, open canopied structure (CDFG 2008). The species is strongly associated with riparian vegetation such as willows, cottonwoods and alders that may be affected by some aspects of the proposed treatments. Preferred yellow warbler nesting habitat includes CWHR tree sizes 2 (1-5 inches dbh), 3 (6-10 inches dbh), and 4 (11-24 inches dbh) in riparian vegetation, with CWHR canopy cover classes P (open) and M (moderate) (CDFG 2008).

### **Project-level Effects Analysis – Riparian Assemblage**

This analysis discloses project effects on the amount of Riparian assemblage habitat available (quantitative), and effects of the project on the quality of assemblage habitat in relation to a representative species (yellow warbler).

#### *Habitat Factor(s) for the Analysis:*

- (1) Quantitative: Acres with changes in amount of Riparian assemblage habitat
- (2) Qualitative: Acres with changes in CWHR tree size class
- (3) Qualitative: Acres with changes in canopy cover

#### *Current Condition of the Habitat Factor(s) in the Project Area:*

There are no distinct riparian vegetation communities mapped within the project area, using EVEG (2007). Riparian vegetation is generally found within the forested vegetation alliances as a subcomponent limited to narrow areas adjacent to water features. An approximation of area

containing riparian vegetation was analyzed based on proximity to 5<sup>th</sup> order and larger streams within the project area. Acres of riparian habitat are estimations based on this analysis, but it is recognized that these are likely an overrepresentation of riparian habitat for the project area.

Approximately 686 acres of land that are representative of the Riparian habitat assemblage under Alternative 2; and approximately 191 acres with Alternative 3. This habitat type is comprised mainly of small pockets of mixed alder-willow vegetation type, and some annual grasses and forbs, with open to moderate canopy closure and tree size classes of 2, 3, and 4.4, and is generally found in conjunction with other forested vegetative alliances such as Douglas fir, ponderosa pine, and black oak. Where present, this habitat type would provide moderate to high quality habitat for the yellow warbler, though only a very small amount of this habitat is present in the treatment units. This habitat type is most commonly present alongside the larger, perennial streams within the project area. Smaller ephemeral water courses present in the project area do not have a continual supply of water (and associated vegetation) and are therefore unable to provide habitat for riparian species such as the yellow warbler.

### Effects of Alternative 2 and 3

#### *Direct and Indirect Effects to Assemblage Habitat*

Although the treated areas may be temporarily less densely vegetated, they will continue to provide habitat for species associated with riparian vegetation at the same level as pre-project (Table 14). There will not be acreage change or conversion into another assemblage directly as a result of this project. Approximately 42% (Alternative 2) or 28% (Alternative 3) of Forest wide Riparian assemblage habitat, as tracked using Forest level data,<sup>26</sup> may be somewhat affected by this project, but will remain as Riparian assemblage habitat. However, not only is the Forest estimate very likely to be strongly underestimated, but the acreage for the proposed project is likely an overestimate of riparian habitat present. In addition, these areas are not targeted for prescribed burning except in very specific circumstances where only a few acres would be ignited intermittently. The vast majority of the riparian habitat within either action alternative will not be impacted as a result of the proposed treatments.

**Table 14. Direct effects on the Riparian assemblage at the project scale.**

<b>Analysis factors</b>	<b>No Action</b>	<b>Alternative 2</b>	<b>Alternative 3</b>
Acres Riparian assemblage within treatment units	686	686	191
Acres of change in CWHR habitat tree size	0	0	0
Acres of change in canopy cover	0	80	0
Canopy cover	Open to Moderate	Open to Moderate	Open to Moderate

<sup>26</sup> Since this assemblage is narrowly defined and difficult to track at the Forest level due to the fine resolution required to detect the occurrence of streamside vegetation, the Forest wide acreage figure is highly likely to be an underestimate of actual Riparian assemblage habitat on the Forest.

#### *Cumulative Effects to Assemblage Habitat*

There is no change in the amount of Riparian assemblage habitat from the project, so there will not be cumulative effects on the assemblage habitat due to this project.

#### *Influence of Project Effects to Habitat Status and Trends at the Forest scale*

According to Forest level estimates, there are currently 1,500 acres of Riparian assemblage habitat mapped on National Forest System lands in the Shasta-Trinity National Forest. Within the last decade, the trend for Riparian assemblage on the Forest is steady at 0.07% of habitat on National Forest lands. The steady trend in amount of Forest wide Riparian assemblage habitat would be expected due to implementation of the Aquatic Conservation Strategy since 1994, which focuses on maintaining and restoring aquatic and riparian ecosystems on National Forest lands.

**Table 15. Forest wide Riparian assemblage over time.**

Assemblage	Amount of assemblage habitat in 1994 (acres)	Percent of Forest in Riparian assemblage in 1994	Amount of assemblage habitat in 2007 (acres)	Percent of Forest in Riparian assemblage in 2007
Riparian	1,500	0.07%	1,500	0.07%

Effects of this proposed action are consistent with the steady Forest wide trend for Riparian assemblage habitat as the action will not result in a change in the amount of riparian habitat. One of the project goals is to make the Riparian assemblage habitat more resilient to fire damage, and thus more sustainable over time.

#### *Direct and Indirect Effects to Habitat for Yellow Warbler*

Riparian habitat in the project units is characterized as montane riparian CWHR type, with pole size to small CWHR tree sizes and open to moderate canopy cover. This habitat provides moderate and high quality yellow warbler nesting habitat.

Habitat for this species will persist after treatments because prescribed fire would be usually be allowed to only back down slope into the riparian areas adjacent drainages containing riparian habitat. In general, low intensity backing fire would be allowed to enter into select drainages, in an effort to reduce the currently high fuel loading. Prescribed fire is planned for very specific conditions that would result in a low intensity burn intended to consume the fuels to the extent possible, and not remove overstory vegetation within the riparian areas. Prescribed fire would improve the habitat by removing the high levels of ground fuels and improve soil nutrient uptake and allow for growth and sustainability of riparian vegetation.

The proposed project has the potential to affect riparian vegetation along select drainages, as low intensity fire may enter the areas near the creek as the fire is allowed to back down into the drainage from the ridge. Low intensity fire burning within portions of a riparian area would not change the habitat assemblage or functionality of the habitat. While riparian vegetation would likely burn to some extent, the impacts to the overall structure and composition of the vegetation

would be beneficial as a mosaic of successional stages and habitat structures would increase diversity on a broader scale.

In the long term, this nesting habitat is more likely to improve with treatment when compared with no action because riparian vegetation would become more resilient to fire. As a result of the project, the existing habitat is more likely to be maintained or improved and would provide high quality yellow warbler habitat into the future.

#### *Relationship of Project-Level Habitat Impacts to Larger Yellow Warbler Habitat Trends*

As described above, the Forest level trend for Riparian assemblage habitat is steady (Table 15). Project effects are consistent with the steady Forest wide trend in Riparian assemblage habitat. Implementation of this project would not affect the Forest wide trend because it would not increase or decrease the amount of Riparian assemblage habitat available. Qualitative effects to yellow warbler habitat are expected to improve habitat in the short term and provide for long term sustainability of high quality habitat in the area.

Population trends for the yellow warbler are tracked and compiled at the Forest level. These data indicate a potentially decreasing population on the Forest. This decrease is supported by statistical analysis in the California foothills BBS strata (Sauer et al. 2008). In light of best available population data, project effects to habitat, and Forest level habitat trends, the project is not likely to result in any meaningful change to population trends and habitat availability for the yellow warbler.

### **Chaparral (chamise - redshank, mixed, and montane chaparral)**

#### **Wildlife Assemblage (wrentit)**

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This assemblage is defined as: all shrub sizes and all shrub density classes of chamise-redshank chaparral, mixed chaparral, and montane chaparral CWHR habitat types.

#### **Habitat/Species Relationship**

The wrentit occupies chaparral habitats with dense structure (CDFG 2008). The species is strongly associated with dense chaparral vegetation that is likely to be affected by the project. This species nests in dense shrubs (CDFG 2008). Preferred wrentit nesting habitat includes CWHR shrub sizes 2 (young shrub), 3 (mature shrub), and 4 (decadent shrub) in chaparral vegetation, with CWHR shrub density classes M (moderate) and D (dense) (CDFG 2008).

### **Project-level Effects Analysis – Chaparral Assemblage**

This analysis discloses project effects on the amount of Chaparral assemblage habitat available (quantitative), and effects of the project on the quality of assemblage habitat in relation to a representative species (wrentit).

#### *Habitat Factor(s) for the Analysis:*

- (1) Quantitative: Acres with changes in amount of Chaparral assemblage habitat
- (2) Qualitative: Acres with changes in shrub size class
- (3) Qualitative: Acres with changes in shrub density

### *Current Condition of the Habitat Factor(s) in the Project Area*

Approximately 3,777 acres of land that are representative of the Chaparral habitat assemblage under Alternative 2; and approximately 481 acres with Alternative 3. This habitat type is comprised mainly of brush species such as a variety of *Ceanothus* species, and green leaf manzanita, bush chinquapin, chamise, and scrub oak. The CWHR habitat types include mixed chaparral and montane chaparral and are comprised of a variety of densities and age classes (dbh classes and canopy closure do not apply to brush species).

### **Effects of Alternative 2 and 3**

#### *Direct and Indirect Effects to Assemblage Habitat*

Portions of the treatment units now consist of habitat conditions that meet the management indicator assemblage definition of Chaparral habitat. The Green-Horse project proposes to prescribe burn 3,777 acres of Chaparral habitat assemblage with Alternative 2 or 481 acres with Alternative 3. The CWHR shrub size class may change as a result of the project though remaining shrubs will continue to be characterized as size class 2, 3, or 4 after treatment, and this falls within the Chaparral assemblage definition.

Overall cover will be reduced as a result of the project, though this will not result in a change in assemblage type because assemblage habitat includes all shrub cover categories within chaparral stands. As a result, treated stands will continue to provide habitat for species associated with chaparral habitat. There will be no immediate acreage change or conversion into another assemblage as a result of this project. The proposed project would affect approximately 6.5% or 0.8% percentage of the Forest wide Chaparral assemblage habitat.

**Table 16: Direct effects on the Chaparral assemblage at the project scale.**

<b>Analysis factors</b>	<b>No Action</b>	<b>Alternative 2</b>	<b>Alternative 3</b>
Acres Chaparral assemblage within treatment units	3,777 acres	3,777 acres	481 acres
Acres of change in CWHR habitat shrub size	0	0	0
Acres of POTENTIAL change in shrub density	0	3,777 acres	481
Shrub density*	S, P, M, D	S, P, M	S, P, M

\*S=Sparse Cover (10-24% canopy cover); P= Open cover (25-39% canopy cover); M= Moderate cover (40-59% canopy cover); D= Dense cover (60-100% canopy cover).

#### *Cumulative Effects to Assemblage Habitat*

There is no change in the amount of Chaparral assemblage habitat from the project, so there will not be cumulative effects on the assemblage habitat due to this project.

#### *Influence of Project Effects to Habitat Status and Trends at the Forest scale*

There are currently 58,000 acres of Chaparral assemblage habitat mapped on National Forest System lands in the Shasta-Trinity National Forest. Within the last decade, the trend for Chaparral assemblage on the Forest is steady at 3% of habitat on National Forest lands.

**Table 17. Forest wide Chaparral assemblage over time.**

Assemblage	Amount of assemblage habitat in 1994 (acres)	Percent of Forest in Chaparral assemblage in 1994	Amount of assemblage habitat in 2007 (acres)	Percent of Forest in Chaparral assemblage in 2007
Chaparral	58,000	3%	58,000	3%

Implementation of this project would not reduce the amount of Chaparral assemblage habitat at the Forest level. As described above, the Chaparral assemblage habitat trend at the Forest level is steady (Table 17). Implementation of this project would not affect the Forest wide steady trend in Chaparral assemblage habitat, because no change in amount of assemblage habitat will occur. Project effects are consistent with Forest level trends that indicate Chaparral assemblage habitat is being maintained over time.

*Direct and Indirect Effects to Habitat for Wrentit*

Prescribed fire would be ignited along ridge tops and allowed to back down slope into areas of both brush and trees. By backing fire down slope during specific prescriptive conditions, the effect will be a mosaic of burned and unburned vegetation and a consumption of the smaller fuels on the ground. Decadent brush with a low moisture content would be more likely to burn than younger vegetation that has more new growth and a higher moisture content, which would result in a mosaic of burned and unburned patches.

This current high fuel loading is putting the chaparral habitat at high risk of severe fire behavior if a wildfire were to occur under unfavorable weather and moisture conditions. Prescribed fire is planned for very specific conditions that would result in a low intensity burn intended to consume the fuels to the extent possible, while leaving a mosaic of burned and unburned brush. Prescribed fire would improve the habitat by removing the high levels of ground fuels and improve soil nutrient uptake and allow for growth of new vegetation.

This project would have potential negative, short-term effects and beneficial long-term effects on approximately 3,777 acres (Alternative 2) or 481 (Alternative 3), of moderate and high quality wrentit habitat available in the project area. Short-term effects of the proposed prescribed burning would consist of burned brush, brush skeletons and small woody debris and duff on areas of brush and chaparral. Long-term effects of this would reduce the risk of adverse effects from wildfire to wrentit habitat that currently exists in the project area.

Effects to vegetation from the proposed activities are expected to be considerably less than with a wildfire, as fires would be ignited under prescriptive conditions. In addition, the proposed activities would trend vegetation composition and structure and wildfire severity and behavior toward historic norms.

*Relationship of Project-Level Habitat Impacts to Larger Wrentit Habitat Trends*

As described above, Forest level trends show a steady trend in chaparral habitat (Table 17). Implementation of this project would not affect the Forest wide steady trend in Chaparral assemblage habitat. Minor effects caused by this project are not likely to meaningfully impact Forest level habitat trends

Population trends for the wrentit are tracked and compiled at the Forest level. These data indicate a fairly stable population on the Forest. Most of the BBS strata that occur on the Forest

show a slight decline, but these declines are not statistically supported. The population appears to be increasing in the Pitt-Klamath BBS strata, and this increase is statistically supported (Sauer et al. 2008). In light of best available population data, project effects to habitat, and Forest level habitat trends, the project is not likely to result in any meaningful change to population trends and habitat availability for the wrentit<sup>27</sup>.

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<sup>27</sup> Other CWHR types that are part of the assemblage that are not moderate or high quality nesting habitat are used as low, moderate or high suitability feeding and cover habitat, and/or low suitability reproductive habitat by the species.

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## **APPENDIX A**

### **CALIFORNIA WILDLIFE HABITAT RELATIONSHIPS (CWHR) SYSTEM**

*Reference: CDFG 2008. California Department of Fish and Game and California Interagency Wildlife Task Group. 2008. California Wildlife Habitat Relationships version 8.2 personal computer program. Sacramento, California.*

<http://www.dfg.ca.gov/biogeodata/cwhr/cawildlife.asp>.

**CWHR Overview.** The California Wildlife Habitat Relationship (CWHR) is a wildlife information system and predictive model for California's regularly-occurring birds, mammals, reptiles and amphibians and is considered “a state-of-the-art information system for California's wildlife.” It contains life history, geographic range, habitat relationships, and management information on 692 species of amphibians, reptiles, birds, and mammals known to occur in the state. It provides the most widely used habitat relationships models for California's terrestrial vertebrate species. CWHR is operated and maintained by the California Department of Fish and Game in cooperation with the California Interagency Wildlife Task Group (CIWTG). CWHR Version 8.2 is used in the management indicator assemblage representative species accounts.

CWHR contains the following components:

- a complete species list of California's 1000+ terrestrial vertebrates;
- life history information and geographic range data by season on 692 regularly-occurring species;
- a standardized habitat classification scheme for California, containing 59 habitats, structural stages for most habitats, and 124 special habitat elements (*A Guide to Wildlife Habitats of California (1988); Edited by Kenneth E. Mayer and William F. Laudenslayer, Jr., State of California, Resources Agency, Department of Fish and Game. Sacramento, CA. 166 pp.*)
- a community-level matrix model associating 692 wildlife species to these standard habitats and stages and rating suitability for reproduction, cover, and feeding;
- A software application containing all system components.

**CWHR Utility.** CWHR has been used for several large wildlife resource conservation efforts including California's GAP effort, the Legislatively-authorized Timberland Task Force effort, and the Sierra Nevada Framework and Forest Plan Amendment efforts. It is one of the primary biological data sets used in an assessment of California's biodiversity for the “Atlas of the Biodiversity of California.” CWHR is used in sustained yield planning efforts by several large private timber companies and is part of regulations adopted by the California Board of Forestry.

**CWHR Validation.** The information in CWHR is based on current published and unpublished biological information and professional judgment by recognized experts on California's wildlife. Research to improve the CWHR System is ongoing and is focused in the areas of model and validation standards, field validation studies, and interpretation of model output. Some examples of these studies are presented below.

### **Model and Validation Standards**

Barrett, R.H. and M. White (authors) and M. Parisi (editor). 1999. Guide for Designing Field Validation Studies of the California Wildlife Habitat Relationships System. Technical Report No. 30. California Wildlife Habitat Relationships System, California Department of Fish and Game. Sacramento, CA.

California Department of Fish and Game and California Interagency Wildlife Task Group. 2000. Standards and Guidelines for CWHR Species Models. Technical Report No. 31. California Wildlife Habitat Relationships System, California Department of Fish and Game. Sacramento, CA.

### **Field Validation Studies of CWHR Predictions**

Avery, M.L. and C. Van Riper. 1990. Evaluation of wildlife-habitat relationships data base for predicting bird community composition in central California chaparral and blue oak woodlands. California Fish and Game 76(2):103-117.

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Verner, J. 1980. Bird communities of mixed-conifer forests of the Sierra Nevada. Pages 198-223 *in* DeGraff, R.M. (technical coordinator) *USDA Forest Service Intermountain Forest and Range Experiment Station General Technical Report INT-86*. Ogden, UT. 535 pp.

Welsh, H.H., Jr., and A.J. Lind. 1988. Old growth forests and the distribution of the terrestrial herpetofauna. Pages 439-455 *in* Szaro, R.C., K.E. Severson, and D.R. Patton (technical coordinators). *USDA Forest Service Rocky Mountain Forest and Range Experiment Station General Technical Report RM-166*. Fort Collins, CO. 458 pp.

Welsh, H.H., Jr., and A.J. Lind. 1991. The structure of the herpetofaunal assemblage in the Douglas-fir/hardwood forests of northwestern California and southwestern Oregon. Pages 394-413 *in* Ruggiero, L.F., K.B. Aubry, A.B. Carey, and M.H. Huff (technical coordinators). *USDA Forest Service Pacific Northwest Forest and Range Experiment Station General Technical Report PNW-GTR-285*. Portland, OR. 533 pp.

### **Interpretation of Model Output**

Garrison, B.A. 1994. Determining the biological significance of changes in predicted habitat values from the California Wildlife Habitat Relationships System. *California Fish and Game* 80:150-160.

Garrison, B.A., R.A. Erickson, M.A. Patten and I.C. Timossi. 1999. California Wildlife Habitat Relationships System: effects of county attributes on prediction accuracy for bird species. *California Fish and Game* 85(3):87-101.

Garrison, B.A. and T. Lupo. 2002. Accuracy of bird range maps based on wildlife habitat relationships models. Pages 367-375 *in* Scott, J.M., P.J. Heglund, M.L. Morrison, J.B. Haufler, M.G. Raphael, W.A. Wall, and F.B. Samson (editors). *Predicting Species Occurrences: Issues of Accuracy and Scale*. Island Press. Washington, D.C.

**CWHR Vegetation Classification System.** There are 59 wildlife habitats in the CWHR System to be used with the predictive models for terrestrial vertebrate wildlife species (27 tree, 12 shrub, 6 herbaceous, 4 aquatic, 8 agricultural, 1 developed, and 1 non-vegetated) (Table 1). In addition, stages and special habitat elements are defined.

Stages are defined for virtually all habitats. A stage is a combination of size and cover class for tree-dominated habitats (Tables 2 and 3), age and cover class for shrub habitats, height and cover class for herb habitats, and depth and substrate for aquatic habitats. A field sampling protocol is well-established for determining stages in all vegetated habitats.

**CWHR Predictive Models.** The predictive model for each species has expert-applied suitability ratings for three life-requisites: breeding, cover, and feeding. For each species, each habitat stage is rated as high, medium, low, or unsuitable for each of these life requirements, as well as a composite rating:

**High:** Habitat suitability rating where habitat is optimal for species occurrence; habitat can support relatively high population densities at high frequencies. Suitability index value = 1.00.

**Medium:** Habitat suitability rating where habitat is suitable for species occurrence; habitat can support relatively moderate population densities at moderate frequencies. Suitability index value = 0.66.

**Low:** Habitat suitability rating where habitat is marginal for species occurrence; habitat can support relatively low population densities at low frequencies. Suitability index value = 0.33

**Unsuitable:** Habitat stage is unsuitable for species occurrence, and the species where habitat is rated unsuitable is not expected to reliably occur in the habitat. Suitability index value = 0.00.

**Table 1.** CWHR Habitat Types (Mayer and Laudenslayer 1988).

<b>Tree-Dominated Habitats</b>
Subalpine Conifer (SCN)
Red Fir (RFR)
Lodgepole Pine (LPN)
Sierran Mixed Conifer (SMC)
White Fir (WFR)
Klamath Mixed Conifer (KMC)
Douglas Fir (DFR)
Jeffrey Pine (JPN)
Ponderosa Pine (PPN)
Eastside Pine (EPN)
Redwood (RDW)
Pinyon-Juniper (PJN)
Juniper (JUN)
Aspen (ASP)
Closed-Cone Pine-Cypress (CPC)
Montane Hardwood-Conifer (MHC)
Montane Hardwood (MHW)
Blue Oak Woodland (BOW)
Valley Oak Woodland (VOW)
Coastal Oak Woodland (COW)
Blue Oak-Foothill Pine (BOP)
Eucalyptus (EUC)
Montane Riparian (MRI)
Valley Foothill Riparian (VRI)
Desert Riparian (DRI)
Palm Oasis (POS)
Joshua Tree (JST)
<b>Shrub-dominated Habitats</b>
Alpine Dwarf-Shrub (ADS)
Low Sage (LSG)

Bitterbrush (BBR)
Sagebrush (SGB)
Montane Chaparral (MCP)
Mixed Chaparral (MCH)
Chamise-Redshank Chaparral (CRC)
Coastal Scrub (CSC)
Desert Succulent Shrub (DSS)
Desert Wash (DSW)
Desert Scrub (DSC)
Alkali Desert Scrub (ASC)
<b>Herbaceous Dominated Habitats</b>
Annual Grassland (AGS)
Perennial Grassland (PGS)
Wet Meadow (WTM)
Fresh Emergent Wetland (FEW)
Saline Emergent Wetland (SEW)
Pasture (PAS)
<b>Aquatic Habitats</b>
Lacustrine (LAC)
Estuarine (EST)
Marine (MAR)
<b>Developed Habitats</b>
Cropland (CRP)
Dryland Grain Crops (DGR)
Irrigated Grain Crops (IGR)
Irrigated Hayfield (IRH)
Irrigated Row and Field Crops (IRF)
Rice (RIC)
Orchard - Vineyard (OVN)
Deciduous Orchard (DOR)
Evergreen Orchard (EOR)
Vineyard (VIN)
Urban (URB)
<b>Non-vegetated Habitats</b>
Barren (BAR)

**Table 2.** Size Class Breakdown for Tree Habitat Types (excluding Desert Riparian, Joshua Tree, Palm Oasis, and Orchard types) (Mayer and Laudenslayer 1988).

CHWR Size Class	CWHR Code	Conifer Crown Diameter (ft.)	Hardwood Crown Diameter (ft.)	Quadratic Mean dbh (inches)
Seedling Tree	1	n/a	n/a	<1.0"
Sapling Tree	2	n/a	<15.0'	1.0"-5.9"
Pole Tree	3	<12.0'	15.0'-29.9'	6.0"-10.9"
Small Tree	4	12.0'-23.9'	30.0'-44.9'	11.0"-23.9"
Medium/large Tree	5	≥ 24.0'	≥ 45.0'	≥ 24.0"
Multi-layered Tree	6	A distinct layer of size class 5 trees over a distinct layer of size class 4 and/or 3 trees, and total tree canopy closure of the layers ≥60.0% (layers must have ≥10.0% canopy cover and distinct height separation)		

**Table 3.** Canopy Closure Classes for Tree and Shrub Terrestrial Habitats (excluding desert-tree and desert-shrub habitat types) (Mayer and Laudenslayer 1988).

CWHR Canopy Closure Class	CWHR Code	Vegetation Canopy Closure
Sparse Cover	S	10.0% - 24.9%
Open Cover	P	25.0% - 39.9%
Moderate Cover	M	40.0% - 59.9%
Dense cover	D	≥ 60.0%

## Appendix A References Cited

CDFG (California Department of Fish and Game). 2005. California Department of Fish and Game and California Interagency Wildlife Task Group. California Wildlife Habitat Relationships (CWHR) version 8.1. personal computer program. Sacramento, California. On-Line version. <http://www.dfg.ca.gov/biogeodata/cwhr/cawildlife.asp>. (Accessed: January 3, 2008).

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